Innovation for de-growth: a case study of counter-hegemonic practices from Kerala, India

Abstract

Our research focuses on the cross-pollination of the discourses of innovation and (post)development in the Global South. We suggest that the buzzword innovation is progressively infiltrating the lexicon and situated practices of development. Within this a hegemonic framing of innovation is emerging that leverages the language of inclusion to promote connection to, and participation in, the global free market economy. This, we hypothesise is closing down a broader debate concerning the goals and roles of innovation and technology in the so called developing world. At the same time, our research suggests that this emerging hegemony is contested, presenting as alternative, minority framings with different normative underpinnings for technology and innovation that challenge the pro-growth and market-led dominant paradigm. We present the results of one of these through a qualitative in-depth case study conducted in the Indian state of Kerala. The case provides interesting insights for the degrowth community in two regards. First it shows a concrete example of an alternative framing of technology underpinned by a set of normative principles connected to those of degrowth. Second, the case shows that alternative technological paradigms based on principles aligned with those of degrowth are not only possible, but can and do co-exist with the hegemonic paradigm.

Keywords: Degrowth from the Global South; technological innovation; discourse of development

Highlights

- The paper suggests that the buzzword 'innovation' is progressively infiltrating the lexicon of development
- The narrative of innovation in the South tends to promote market-based development
- Degrowth principles in the North are echoed by alternative, minority framings of technologies in the South
- The paper presents the results of a qualitative case study of one such framing conducted in the Indian state of Kerala

1 Introduction

In 1953 the British historian Arnold J. Toynbee published the transcription of his Reith Lectures in the book 'The World and the West'. Reflecting on the role of technology as a transformative social agent within foreign societies he wrote:

> '. […]'If one abandons one's own traditional technology and adopts a foreign technology instead, the effect of this change on the technological surface of life will not remain confined to the surface, but

> will gradually work its way down to the depths till the whole of one's traditional culture has been undermined and the whole of the foreign culture has been given entry […]' (Toynbee 1953: 55)

This statement reminds us that technologies and innovation are culturally, socially and politically constructed – unintentionally, or by design (Feenberg, 1999; Pinch and Bijker, 1984; Winner, 1993). This reflection is of fundamental importance for those within the degrowth community who ask 'what role would technology play in a degrowth society?' Toynbee's intuitions force us to reframe the question, asking instead 'what kind of society and political economy would promote 'degrowth technologies' in the first place. There might be technologies compatible with the program of degrowth, but these have to emerge from and be governed by a *normative socio-political framework* for techno-visionary science and innovation which privileges degrowth as a key normative anchor point and social norm (Latouche, 2009; Nierling, 2014; Owen et al., 2013).

Innovation aimed at degrowth could almost be regarded as an oxymoron. The seminal work of Georgescu-Roegen (2011) brought into sharp relief the limits of technological progress vis-à-vis the resource and ecological limits of a finite planet. Nevertheless, the faith in progress – and the growth fetishism that has accompanied it - has had at its heart the engine of apparently endless technological development, innovation, competition and creative destruction (Schumpeter, 1994). This arguably hampers rather than fosters the formulation of viable alternatives to the present growth-addicted paradigm. Western reframings of growth as 'green growth' and other cognates such as the 'circular economy' often we argue present technologies and innovation as a 'techno-fix'. These cognates might take into account the limits of 'planetary boundaries' but arguably neglect the social and political and insufficiently challenge, or present transformational alternatives to, innovation – based, growth economies. Many appear to echo the technological optimism, even hubris, that characterises industrial capitalism (Franceschini and Pansera, 2015). This incapacity to escape the growth paradigm is not only due to the ideological structures that underpin and lock-in industrial societies – its mental models or 'imaginary institutions' (Castoriadis 1998) -, but also reflects the functional aspects of an economic system designed to maximise economic output, often based on resource extraction and material throughput. Technology and innovation have been at the core of this system, certainly since the industrial revolution in the West.

One interesting but as yet underexplored avenue for research is the potential for alternative world views in the Global South which have escaped, or at least resisted, this path dependency and lock-in. Of particular interest are those framings which include a degrowth normative anchoring and in which technology and innovation are in some way implicated. 'Transition discourses' in non-Western cultures (Escobar, 2015), offer rich potential in this regard. This paper explores one of these in a case study undertaken in Kerala, India. Before introducing this we set the broader scene, arguing on the basis of our previous research that innovation and technology – or rather a specific way of *framing* these – are being used as a powerful discursive tool to spread the ideology of economic, growth-based development beyond the boundaries of the West, with constitutive impacts on the ground. We argue that this process harbours a set of political and cultural assumptions and drivers that are gradually transforming, even homogenising, the immense diversity of ways of life and being in the Global South, in favour of social structures that can accommodate the ideology of the growth-based market economy. We further argue that it is doing so in an outwardly apolitical manner in which any measure of reflexivity, particularly second order (i.e. reflexivity that questions the very assumptions and norms that sit behind our current economic and social reality (Doridot et al., 2013; Lenoble and Maesschalck, 2003)) is side-lined.

Drawing particularly on the contributions of post-development scholars – e.g. (Escobar, 2015; Rist, 2011; Sachs, 2010) - we suggest that the project to *develop the underdeveloped* in the South is gradually shifting from a historical emphasis on 'top-down', mainly state-driven projects, to market-based initiatives led by the private sector (or private – public partnerships), which place a strong emphasis on 'innovation for the poor' and 'inclusive business models'. In this shift, technological innovation is fundamentally designed *by and for the market*, limiting the diversity, range, possibilities, goals, motivations for and impacts of technology. In this sense, the increasing emphasis on market - dependent innovation in the South we suggest, may serve to marginalise alternative framings of technology which, as documented in several cases (Acosta, 2010; Dagnino, 2009; Smith et al., 2014), represent a vibrant as well as variegated universe of experiments that have been traditionally opposed to the market-driven commodification of the process of technical change. Those alternatives (or *pluriverses* in Escobar's (2011) words), are a synthesis of holistic indigenous wisdom and creole cultures that share with degrowth advocates the aspiration to seek alternatives 'to progress, development, modernity, a notion that wants to recover the harmonious relation between human beings and their surroundings, between humanity and its fellows' (Thomson 2011: 452; see also Escobar 2015 for a recent review).

The main contributions of the paper are twofold. We firstly elaborate on the emergence of the discourse of innovation in the so called 'developing world' as one that is becoming essentially oriented towards and driven by the market. In the Global South, this discourse derives and evolves, we argue, from what post-development scholars have called the 'tale of development' (Escobar, 2012). We show that the academic field of development economics is being 'cross-pollinated' with elements from the management and business community of scholars and practitioners, often framing poverty as a 'delivery issue' i.e. something that can be 'fixed', for example by delivering affordable products tailored to address the needs of *poor consumers,* or by positioning the poor as producers (e.g. of artisanal products) for the global market. Innovation, often leveraging the language of *inclusion* (e.g. 'inclusive business models') and *self-help,* becomes the vector that allows social enterprises or Multinational Corporations (MNC), to enter and engage with what is viewed as a little explored but vast potential market at the 'Bottom of Economic Pyramid' (BOP), i.e. those people living on less than US$ 2 a day. Secondly, we contribute to the debate on 'degrowth and technology' by showing how alternative forms of framing technology in fact *co-exist*, attempting with varying degrees of success to resist this emerging dominant discourse. This helps us to explore what kind of technological arrangements are proposed and practiced by groups founded on principles which include a degrowth normative stance. Here we present the results of a qualitative case study focused on one of these, the *Kerala Science Literature Movement (KSSP).* The case of KSSP shows how technology can be framed as a tool for autonomy, social empowerment and political transformation through the development of a hybrid narrative (Pansera and Owen, 2014) in which economic growth is neither an imperative nor a priority. We examine KSSP then as a case example of technology for degrowth from the South, a topic that remains to date under-researched (Corazza and Victus, 2015).

2 Theoretical framework

> 'I believe that we should make available to peace-loving peoples the benefits of our store of technical knowledge in order to help them realize their aspirations for a better life… Greater production is the key to prosperity and peace. And the key to greater production is a wider and more vigorous application of modern scientific and technical knowledge.' (Truman, 1964[1949])

With these words, pronounced on January 20th 1949, the president of the United States Harry Truman inaugurated an era of aggressive economic interventions in those parts of the globe that were soon to become named as the 'developing world'. Words such as 'development' and 'economic growth' became central to the discourse of Western industrialised countries wishing to improve the lives of 'the others' (Escobar, 2012, 2010), a long term project rooted in a profound and renewed faith in progress after World War II underpinned by 'modern scientific and technical knowledge'. Truman draws a line between the prosperous nations and the rest, 'the others' living in those underdeveloped areas in which economic life is 'primitive and stagnant'. This is a state of pre-development, a sort of primitive age of obscurantism that has excluded people from the benefits of progress, wealth and democracy, a temporary condition of underdevelopment from which they can escape by embracing the western paradigm of progress and economic growth. According to one of the forefathers of degrowth, Ivan Illich, Truman's discourse simplified the complex notion of poverty, scarcity and 'basic needs' (Sachs, 2010*).* It had profound consequences in terms of the way non-western countries began to perceive themselves and the policies they embraced to emerge from their 'underdeveloped' condition (Escobar, 2012, 2010; Rahnema and Bawtree, 1997)

A key element of Truman's speech is how he implicates science and technology, linking these with development and economic growth as the path for 'the others' to become part of the developed circle. He, indicates the source of peace and prosperity as being technical knowledge, or more precisely '*our store* of technical knowledge'. In doing so science and technology would come to occupy a special and privileged place in the project of development. Truman's doctrine emerges from two important historical roots of relevance to our discussion. The first was the systematic convergence of science with industry that started in the Industrial Revolution and extended into the beginning of the 20th century and beyond (Freeman and Soete, 1997). The second was the invention and affirmation of national systems of accountancy, and in particular GDP. Invented by the American economist Simon Kuznets as an economic instrument to boost production during war time, GDP philosophy reshaped the economic thinking of the time in a way that would have profound consequences in the years to come. It legitimised the concept of *development as economic growth* (Fioramonti, 2013), growth which could in turn be measured. Pressures to maximise GDP persuaded political establishments in the 'developing world' to prioritise those policies that favoured economic growth, with great importance being placed on the maximization of industrial and agricultural output.

2.1 Entry of the buzzword innovation into the lexicon of development

The above synthesis is an oversimplification of the discourse of development, which has in reality constantly evolved since the 1940s and which remains deeply contested. While a detailed analysis of this evolution is out of the scope for this article - e.g. see (Escobar 2012; Ferguson 1990; Rist 2011; W. Sachs 1990) - we highlight one important shift that occurred from the original focus on state-driven economic development grounded in science, technology and industrialisation (also known as the 'big push'). The rise of neoliberalism in the 1980s gradually shifted the focus away from the state to the private sector. The seminal contributions of Schumpeter (1934, 1994), who saw in *innovative* entrepreneurs and companies the engine of *creative destruction* that fuels capitalism, were reawakened, first in academia and then later in the political agendas of the developed, and then developing countries. As Krause (2013) suggests, this shift marked the emergence of a discourse of innovation in which there is a clear distinction with *technological change.* The latter is an umbrella term that indicates the general evolution of technological artefacts and organizational routines, whereas the former refers to the process of bringing new processes, products or services to the

market. In this sense, the overwhelming contemporary understanding of the notion of innovation, at least in economics and management studies, is one predominantly framed within the boundaries of the *market economy* (Bessant et al., 2005; Dosi and Freeman, 1988; Freeman and Soete, 1997; Tidd and Bessant, 2009). This is clearly visible in the increasing incidence of 'innovation' as a buzzword in the management academic literature (see Figure 1 left-side chart) as well as the outputs from international organizations such as the EU Commission (2015), the OECD (1992, 2015) and the World Bank (2010).

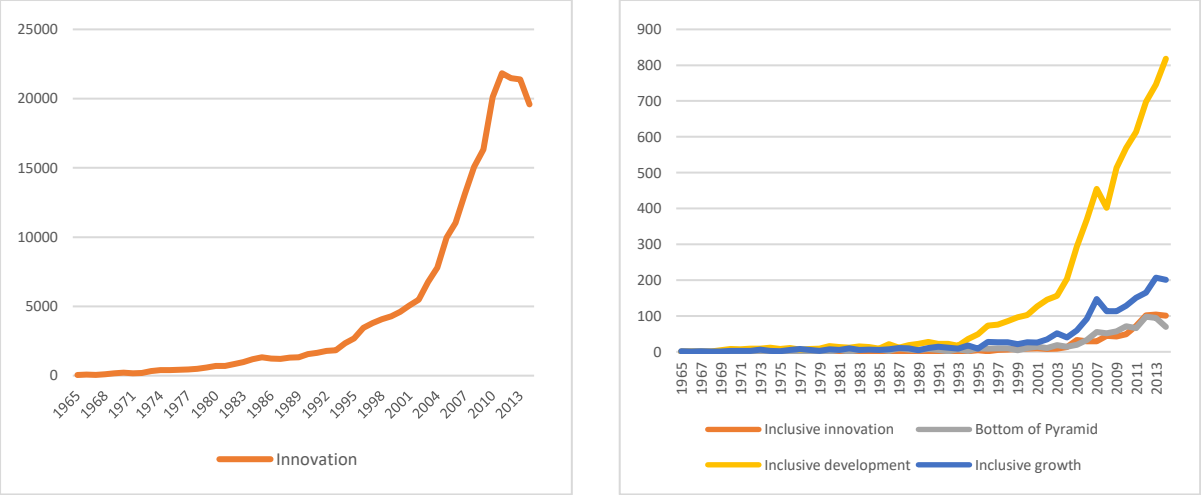

Figure 1 Keywords citations per years. Source: Scopus. Research undertaken November 2015.

2.2 The cross-pollination of innovation and development discourses

The rise of the discourse of innovation in the West has clearly influenced the nature of development interventions proposed since the 1980's. This influence is visible in the emerging literature focused on Innovation Systems in developing countries that aims to replicate those economic, structural and institutional conditions under which innovation is perceived to flourish in the north (Arocena and Sutz, 2000; Lundvall et al., 2009). It is visible more generally as an increasing incidence of the buzzword innovation in the development studies literature (Krause, 2013) and in particular in the emerging literature relating to so called 'Bottom of the Pyramid (BOP) innovation', 'frugal innovation' (also known as Jugaad in India (Radjou et al., 2012)) and inclusive growth/development in the business and academic communities (Bound and Thornton, 2012; George et al., 2012; Prahalad, 2012a) (see also Figure 1 right-side chart). Of these, the 'BOP narrative' has become particularly influential in the last two decades. Increasingly popular among organization and management scholars (e.g. those based in India and the US), this body of work focuses on the search for opportunities for companies that are interested in opening markets at the BOP through the development of 'good-enough' and affordable products (London, 2009; Prahalad & Mashelkar, 2010). These scholars hypothesise that the BOP could be a source of breakthrough innovations (Prahalad, 2012b) and a huge potential market for multinational corporations (London & Hart, 2004; London, 2009). In this view, marketable innovations (e.g. products) are proposed as a powerful means to generate profit whilst simultaneously contributing to poverty alleviation and social exclusion.

A network analysis of keyword occurrences in the Management and Organization literature performed by Pansera and Martinez (2015) with the help of the free open-source software Gephi[1] on a database of 218 papers extracted from Scopus and the Web of knowledge, reveals a strong association between the keyword innovation and other buzzwords specific to development studies. The analyses used the database to create a network of keywords and their relations (Fig. 2). Each node of the network represents a keyword and each link between 2 nodes indicates that the 2 keywords appear in the same paper. The thickness of the link is proportional to the number of times the 2 keywords appear in the same paper. The analysis shows a strong association between the BOP narrative and the use of the concept of innovation.

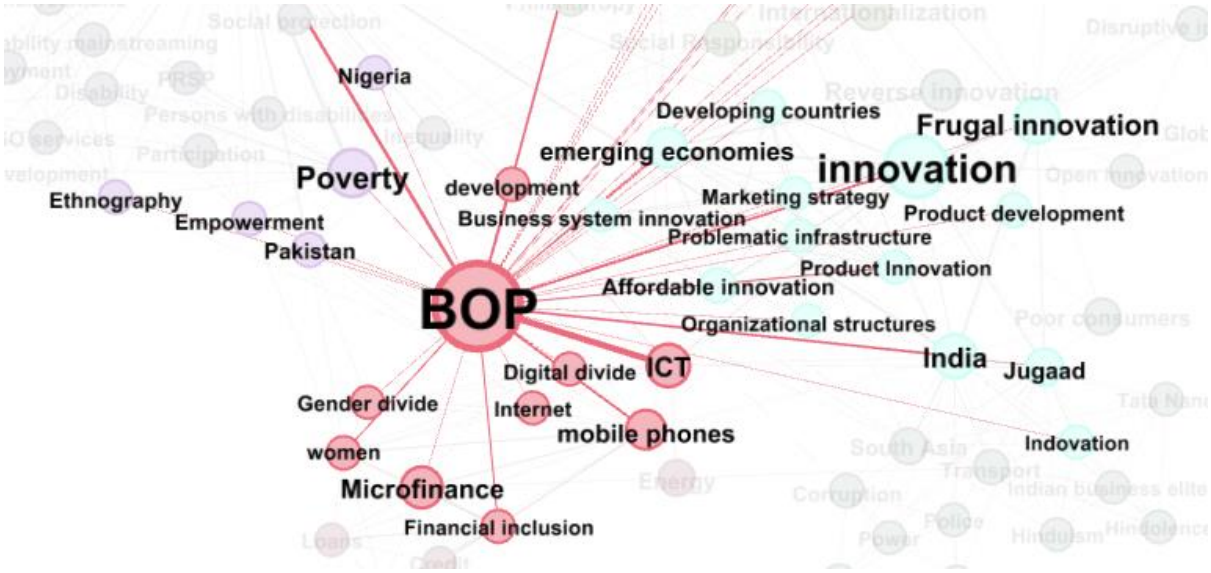

Figure 2 Keywords network analysis (adapted from (Pansera and Martinez, 2015)***)***

This association suggests, at least in the academic publications, a 'cross-pollination' between the discourses of development and innovation. The literature appears to show that this cross pollination privileges 'technical fixes' while simultaneously depoliticising the notion of development, locating this within a market paradigm while disconnecting it from the social, cultural, environmental and political, particularly in relation to poverty, social exclusion, financial and material scarcity and political instability (e.g. Ferguson 1990; Swyngedouw 2015; White 1996).

2.3 Degrowth in the South: searching for 'alternatives to development'

In essence what emerges from these market-centred framings is a specific ideological view of the world. With an emphasis on profit, customer/client relations, management, markets and entrepreneurialism, we have observed the tendency of these framings to hide the existence of countervailing, often minority types of discourses of innovation in the Global South that focus more (or exclusively) on concepts like social justice, empowerment, equality, and democracy (Arora and Romijn, 2011) and other models of political economy, for example those founded on principles such as degrowth. More recently this ideology has been reframed in terms of 'Inclusive Growth/Development' (George et al., 2012; Sachs, 2004; World Bank, 2008), in which the rhetoric of inclusion is key. Pursued through 'inclusive forms of innovation' (Altenburg, 2009; Heeks et al., 2014; Nijhof et al., 2002), 'Inclusive innovation systems' (Foster and Heeks, 2013) and 'inclusive business

[1] Gephi is freely available at: https://gephi.org/ (last accessed November 3, 2014)

models' (UNDP, 2008) the concept of inclusion remains vague. Inclusiveness in general advocates for a more equal and fair distribution of the economic benefits of innovation, development and economic growth, (Cozzens and Sutz, 2012; Papaioannou, 2011) with an underlying theme being that the poor are excluded from the benefits of development and, consequently need to be *included* in those productive activities that create economic growth (Peredo, 2012). Our overall hypothesis is that discourses of inclusive growth and inclusive innovation appear to present a further evolution of the original colonial project of development that aspires to develop the underdeveloped by transforming their pre-existing social structures. In doing so they risk presenting an outwardly depoliticised view of the process of development while dismissing or neglecting experiments and countervailing voices that relate to the role of science and technology in society in the South. In the words of (Escobar 2015), the South may require 'alternatives to development' rather than an alternative development. We argue that, together with those in the degrowth community, those alternatives can be usefully grouped under the same theoretical critique to the Western-born notions of progress, growth and modernity that Escobar (2015) has labelled 'transition discourses'. These counter-hegemonic narratives are diverse and plural (e.g. the ideas of self-reliant villages based on low-tech artefacts proposed by Gandhi and Kumarappa (Corazza and Victus, 2015); the appropriate technology movement inspired by Schumacher (1973); grassroots innovator movements in Asia and Latin America (Gupta, 2012; Smith et al., 2014); social enterprises in the North and movements inspired by degrowth principles (Sekulova et al., 2013); and the more recent Makers and DIY movements (Domènech et al., 2013). What these share in common with the degrowth movement is the aspiration to escape the logic of 'commoditised' technology embedded in the modern, depoliticised, market-driven notion of innovation and experiment instead with a 'slower race to citizens' solutions' as an alternative to industrial capitalism (Leach and Scoones, 2006). In exploring these practices on the ground we aim to understand better the possible functions and socio-technical interactions of technology in a degrowth society, drawing on experiments that lie in the shade of the hegemonic discourse of commodified technology. The following sections describe the evolution of one such countervailing narrative in which concepts of science, technology, social empowerment and degrowth are deeply intertwined, the *Kerala Science Literature Movement,* a group of Indian social activists that opposed the top-down technological modernization and growth agenda of the country conducted by its first Prime Minister, Jawaharlal Nehru.

3 Research Design and Methods

Before describing the case study in detail, we first briefly introduce the research setting and the processes of data collection and analysis that we followed.

3.1 Research setting for Case Study

The Indian subcontinent is an incredibly rich and diverse reservoir of worldviews, ways of life and pockets of resistance to neoliberal globalization, and as such holds huge potential for the exploration of alternative framings of science, technology, belief systems and political economy. As described above, more recently the subcontinent has been also the cradle of new buzzwords such as BOP innovation, Jugaad and inclusive innovation among others. For those reasons we consider the Indian setting a promising environment to research these countervailing ways of framing innovation in the Global South. Furthermore, some of the forefathers of degrowth, such as Ivan Illich and Friz Schumacher were influenced by those such as Gandhi and Kumarappa who had celebrated the virtues of rural self-subsistence and constructed their discourse of technological progress around the proportional and limited upgrade of rural means of subsistence (Corazza and Victus, 2015). Central

to Gandhi's vision was a model of decentralised development based on traditional and local knowledge and technology (Mishra, 1999). For Gandhi, although he was aware of the necessity to improve the condition of the rural poor, rural subsistence had to be preserved from industrialism - because it was the only way to preserve the spirit of the country and, at the same time, allow for a more equitable development (Abrol, 2014; Gandhi, 2008). The Gandhian idea was based on the notion of a self-reliant, village economy. This model gives a central role to the village, defined as a self-sufficient unit of social life (Gandhi, 1959; Wade, 1987). His non-party, self-governing model of local democracy was in deep opposition to the centralised power structures characteristic of the classical European nation state (Terchek, 1998).

The Gandhian political agenda however lost its momentum with his assassination and the rise of a Nehruvian industrial policy that ushered in the development of large scale industrial projects. Nevertheless, the ideas held by Gandhi and Kumarappa survived and became admixed with Marxist and eco-socialist principles which presented as a myriad of grassroots initiatives and social movements (Wade, 1987). One of the more relevant examples of those countervailing movements are the People's Science Movements (PSMs) (Abrol, 2014, 2003). The PSMs is a network of different social movements that has been active in India since the early 1960s. Its origins can be traced to the numerous educational groups working on the popularization of science in Indian local languages. The primary mission of those groups that initiated the PSMs was to emancipate the Indian people through the popularization of scientific thinking. Between the 1970s and the 1980s, the focus of many PSMs shifted towards the use of science and technology for *reshaping Indian society*, with particular attention to the transformation of the productive relations existing within the Indian industrial sectors. The underlying idea behind the PSMs actions is that poverty and exclusion in the country are not due to institutional or technological underdevelopment, but to an unfair distribution of power between castes and the new social classes that emerged in the post-independence period. In this sense, the introduction of appropriate technology to upgrade the traditional productive activities of the poor Indian workers is aimed at reshaping the social and power relationships that marginalised them. PSMs' discourse is based on the idea of *social transformation through science and technology,* conducted by creating networks of self-sufficient and community based economies. According to PSMs activists, the majority of Indians are excluded from the benefits of the development project and are oppressed by social structures that hamper equal distribution of social goods. Markets cannot be inclusive, and industrial development is an exploitative enterprise that jeopardizes social and environmental integrity. As an alternative they mobilise around a countervailing framing of technology which privileges new forms of autonomy and subsistence based on local knowledge and appropriate technology.

Given the emphasis on challenging western, growth and market - focused framings of technology and society we elected in this paper to focus on one of the first PSMs founded in Kerala in 1962, the Kerala Sasthra Sahithya Parishath (KSSP) – meaning *Kerala Science Literature Movement.* We analysed in detail their narrative of science, innovation, development and society and its connections to conceptions of degrowth as an example of counter - hegemonic practices in a non-Western setting.

The activity and influence of KSSP in Kerala cannot be fully understood without briefly mentioning the celebrated development model that has characterised this Indian state since the 1970s. An exhaustive discussion about the 'Kerala model' is out of the scope of this article (for more complete accounts see Parayil (2000) and Véron (2001)). Here we simply emphasise that the activities of the KSSP must be located within a political context that elaborated a particular model of development which, since the 1970s, has been recognized for its decoupling of impressive gains in human

development from GDP growth (McKibben, 1995). The high literacy rates and low rates of infant mortality are two examples of the impressive achievements of the Kerala model, which result from a combination of state investments in health and education and high social mobilization, class-based politics, and comparatively well-balanced minority communities (Heller et al., 2007). The KSSP is probably the most famous (but not the only) of all Kerala's NGOs and a pillar of this model, because it long enjoyed strong links to Kerala's Marxist party that ruled the state for decades (Parayil, 2000).

3.2 Data collection and analysis

Data were collected in India from August to December 2013 in the state of Karnataka and Kerala, with one week spent in the Integrated Rural Technology Centre[2] (IRTC) in Palakkad, the experimental centre founded by KSSP which aims to upgrade the traditional technologies of the region. The vast majority of the data collected consists of semi-structured interviews recorded and verbatim transcribed (see Table 1). We complemented the interviews with field notes, videos, photos and the material published by the movement itself. The data collected were subsequently analysed with the aid of NVivo 9 software, which is widely used to analyse heterogeneous, qualitative datasets (Miles and Huberman, 2003).

Table 1 Data Collection for KSSP Case Study

Methods	**Data collected**	**Concepts studied and induced**
Semi-structured interviews with PSMs activist	9 interviews	Innovation strategy, sources and purpose and framing of Science & Technology.
Observation	Non-participant observation, dissemination material, case studies, photos, videos	Norms, values, routines, organizational capabilities, collective practices

In the analysis of the data we followed a qualitative grounded theory approach based on the methods proposed by (Gioia et al., 2012). The analysis was performed in two main stages: first the creation of a 'data structure' and then a discussion about the relationships existing between the theoretical dimensions that emerged from that structure. All the interviews aimed to disclose the way KSSP has been framing their narrative of science and technology and its relationship with development and (de)growth agendas. In particular, in the interviews we attempted to record the history of the movements, the philosophy underlying the movements and their experiments on the ground. We performed an initial (1st-order informant- centric) coding of the data using a set of *a priori themes* based on the questions: *how do the KSSP activists frame innovation/technology? How do they frame their identity as innovation scholars/promoters and/or innovators, their practices and how do they communicate these?* At a later stage, we included and/or removed in the codes list other categories that were emerging from the data until we reached a manageable number of codes. After this first step we performed a 2nd-order analysis based on the question: *is there some deeper structure in the 1st-order array?* In this phase we asked whether the 1st-order codes suggested concepts that might help us describe and explain the *narrative* of the informants. This step provided us with a list of four, 2nd-order (theory-centric) constructs that were finally assembled into two overarching theoretical dimensions that frame the KSSP narrative: *science and technology*

[2] http://www.irtc.org.in/ (last accessed December 10, 2014)

for social revolution; and *the politics of technological development* (see Figure 3). In this way we built a data structure (Figure 3) that has two main functions. The first is to provide a visual synthesis of the analysis carried out on the original data. The second is to provide the backbone to present a detailed account of this analysis in a *narrative fashion*.

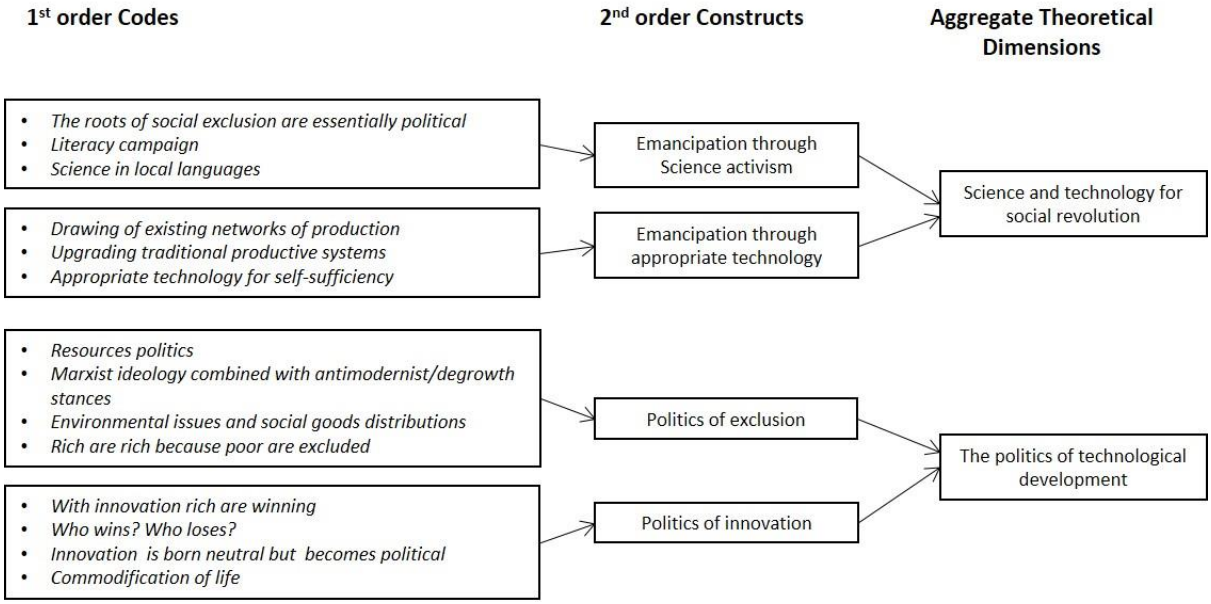

Figure 3 Data Structure for the case study

4 Findings: democratization of technology as a political strategy

The main theoretical dimensions that emerge from the analysis of the data can be classified in two overarching aggregate themes: i) Science and technology for social revolution; ii) The politics of technological development. The two themes are treated in detail in the following sections.

4.1 Theme 1: Science and technology for social revolution

The ideas that motivated the original KSSP leaders in the 1960s are readily evident in the first theoretical dimension that emerges from the data: '*science and technology for social revolution'*. This, broadly, is the ideological proposition that the popularization of scientific rationality in rural India would eventually lead to a process of social transformation. This idea draws on two underlying constructs: the recognition that *the roots of social exclusion are essentially political* and the assumption that the underlying causes of exclusion can be disarmed through 'science activism' i.e., *the popularization of scientific thinking amongst the poor*. The People's Science Movements realised that, despite the efforts of the central government to create a modern secular state in the Indian post-independence season, by the late 1970s the overwhelming majority of Indians were still illiterate. The popularization of science however could not begin unless a significant part of the population acquired the capability to absorb the message of scientific rationality. To achieve this objective, in the 1960s the KSSP engaged in several campaigns for rural literacy in the state of Kerala, which had enormous success (Parameswaran, 2008). According to KSSP leaders, those campaigns contributed to the fact that in Kerala today literacy indicators are the highest in the country, around

95.5%[3]. The Kerala People's Science Movements, unified under the organization called KSSP, focused its efforts on the translation of scientific literature from English to the local language, the Malayalam. The network of KSSP activists and its publishing arm, the core of its scientific divulgation activities, are today present and active in every district of the state. Being a volunteer-based organization, the main funding source for the movement comes from the sale of books to schools, public libraries, small shops and individuals. KSSP built up its structure through a capillary network on the ground that follows a strategy aimed at approaching the rural and urban population with social events like street theatre, music events, door-to-door campaigns, and activities in rural schools. As a result, over the years KSSP created a rural intelligentsia initially formed by teachers, educators and students, then by doctors, engineers and other professionals. George D'Cruz, one of the early KSSP activists described to us their mission:

> '[…] the people have to decide their destiny. For that they should have a weapon to fight against those who are against them. And the weapons should be science. Knowledge, so we have to equip people with the weapon. Namely, knowledge and science.'

After this initial stage of alphabetization of the rural population, the KSSP elaborated a second strategy that they called 'science for social revolution' (Parameswaran, 2013) (see above). This renewed strategy initiated a new mind-set to endow in the people the rational awareness to change their social environment and overcome ancient superstitions and caste-based prejudices. The materialization of this idea was the connection of scientific activity carried out in the laboratory *via technological innovation* with the issues faced by the rural poor. The KSSP promoted its actions through the networks they had created over the years. These initiatives culminated in the creation of the Integrated Rural Technology Centre (IRTC) in 1987. This was inspired by the feeling that the diffusion of scientific literature alone was not enough to emancipate rural populations. Once people have been endowed with the instruments to understand science, they should *use it* to transform their social contexts. This implies the application of scientific rationality to the *local systems of production*. In the words of the present director of the centre, Dr Lalithambika:

> 'Introducing some scientific literature alone will not work. Whatever we say we have to demonstrate it… make it practicable and bring it to [the poor]. […] Suppose I said you can be self-reliant. You can do this and you can do that. Nobody will believe me. Unless I show that there is a way to be self-reliant. Then these people who started the scientific literature diffusion, they thought that there should be a research organization to support and promote whatever they preach. That can be practiced. It has to be brought into practice. So, in that way in 1995 this centre was established.'

At the beginning of December 2013 we spent one week at the IRTC in Kerala observing their activities. The IRTC is located in the middle of paddy fields nearby Palakkad in the state of Kerala. The IRTC consists of seven buildings built with locally available materials, following a mix of traditional and modern techniques. In this sense, the centre is a small monument to frugal innovation and appropriate technology. The main office is powered by a 2kw photovoltaic system. The office is run by open-source platforms: they use a Linux distribution called Debian. All the buildings are equipped with locally designed and produced biogas systems fed by food waste. The main kitchen is provided with a huge biogas plant that is able to produce 5-6 hours of cooking gas. Rainwater is collected through a system that interconnects the roofs and is stored in a tank to be

[3] An estimation of Kerala total literacy rate is available at:

http://www.kerala.gov.in/index.php?option=com_content&view=article&id=3670&Itemid=2958 (last accessed March 2 2014)

redistributed within the building with a solar-electric pump. The centre is also equipped with a mechanical workshop, a chemical lab, a pottery workshop, a plant to produce vermin-compost from market waste, a plant to process natural rubber, a fish farm, a mushroom farm and a congress hall. The centre also hosts several local grassroots organizations, and organises and hosts training courses of all sorts. In the intentions of its creators, the IRTC is a popular laboratory to apply scientific knowledge to the rural settings.

Over almost two decades of activity, the IRTC has developed a wide range of technological artefacts and processes with the intention to upgrade the productivity of the rural communities in Kerala. These activities have been named People's Technology Initiatives (PTIs). A former scientist from the Council of Scientific and Industrial Research (CSIR), Dr Lalithambika explained the 'KSSP approach to Science & Technology' by telling the story of the industry of soap. She stated that in Kerala the production of soap traditionally occurs at a domestic level. Soaps traditionally are produced in households using locally available raw materials, mainly coconut oil. With the introduction of industrial soap, the cost of raw materials increased and the attraction of homemade soaps drastically decreased. Industrial soaps are cheaper and come in all sorts of colours, shapes and flagrances. According to Dr Lalithambika, however, the soap industry drove the price of coconut oil to unaffordable levels for the rural poor. Moreover, industrial soaps often contain unknown chemical compounds that threaten the quality of local aquifers. For these reasons, at the IRTC they developed an improved process to make soap based on traditional techniques. The process has been standardised and is diffused through the KSSP network in the territory. The KSSP activists in every *panchayat* (e.g. the local districts) of the state are in charge of promoting the soap-making technology on a volunteer-basis. The people who are interested, mainly women, can spend a few days at the IRTC to learn the process. In order to control the quality and improve the efficiency of the process, the IRTC has developed a 'soap kit' that contains all the raw materials in the right proportions. People can then personalise their soap by adding locally - available natural oils. The kits have been designed to produce soaps that are remarkably cheaper than the industrial soaps.

However, the aim of the centre is *not to scale the process or create a market* for the KSSP soap, but rather to *foster the consumption of locally-produced commodities*. In the words of the IRTC director:

> I can make soap sitting in my house. It takes only one or two hours for 20 soaps. They can purchase the kit from here. And they can take coconut oil from their own yard, their backyard coconut where they can produce these oils. This soap, which they are making, is partly for self-consumption and partly for neighbourhood selling. Thousands of people we have trained from here.

The same approach is applied to other technologies like pottery, waste management, biogas plants, rubber manufacture, cooking technologies and other farming technologies. All the innovations and improvements made on pre-existing traditional processes are not primarily designed to be sold in a competitive market but rather to *substitute* non-local with self-produced products. However, it is important to note that the centre does not preclude the wider sale of products, and a major source of income for the IRTC, indeed, is the supply of soaps to hospitals and schools in Kerala. They also manufacture and sell different kinds of machineries for small scale local workshops.

As the activist Prof Sabyasachi Chatterjee stated, the IRTC is a monument to people's subsistence and survival. The core of the KSSP philosophy resides in the assumption that human societies are not homogenous but composed of heterogeneous groups with interests that are sometimes in conflict. In particular, society is split into a vast majority of impoverished people and an increasingly rich minority. The slogan 'Science for social revolution' was forged from this basic assumption and is clearly stated in the PSMs Manifesto:

> The majority that was getting impoverished were increasingly able to see and understand how the minority is using its knowledge and skills to perpetuate its hegemony and, consequently, resist it more and more effectively. The ultimate success of the majority to stop and reverse this impoverishment is termed as 'social revolution' and led to the adoption of the slogans 'science for social revolution.' *(Parameswaran, 2013: 131)*

As a result, the hegemonic discourse of innovation, technology, international markets and economic growth are seen as a mutually-reinforcing *political process* that does not necessarily benefit the underprivileged majority; on the contrary, in their view it usually favours a *manipulative, privileged* minority.

4.2 Theme 2: The politics of technological development

The conceptualization of socio-technical change as a non-neutral process has been forged within the PSM's narrative over years of collective action and campaigns. At the beginning, the urgency to struggle against the semi-feudal culture that was so deep-rooted in Indian society manifested itself in a strong emphasis on the scientific outlook. Then the movements realised that the 'incorporation of science and technology in the production process was not taking place in a vacuum but within the parameters of a profit oriented society' (Parameswaran, 2013: 22). It was in the decade of the 1980s that the KSSP became aware that science and technology can be not only a means of empowerment and emancipation but also a means for exclusion, abuse and environmental degradation. The awareness of the latter resulted in the mobilization against several development projects promoted by the central and local government as well as big corporations. Examples are the campaigns against the construction of a spillway in the delta of Kuttanad, the construction of a dam in the Silent Valley National Park that threated to flood an important reservoir of wildlife and innumerable anti-pollution struggles conducted in the industrial poles of Kerala[4] (Parameswaran 2013: 22-29). The objectives of those campaigns were to educate people to understand how to interpret the data coming from scientific research and use this to *disarm* the logic behind the development projects. In the great majority of the cases, the KSSP's actions were opposed by groups like the local Catholic Church, local business associations and the central government.

Drawing on those experiences, the KSSP locates science and technology within an elaborated, countervailing anti-capitalistic discourse that surprisingly combines typical Marxist positions (e.g., the emphasis on class struggle) with anti-modernist stances (e.g., self-reliance, local subsistence economies). In order to explore this intriguing synthesis we visited one of the fathers of KSSP, Mr M.P. Parameswaran, in his house in Thrissur. M.P., as he is fondly called among the PSMs activists, is a former nuclear engineer who was involved in the first Indian nuclear programs in the 1950s at the Bhabha Atomic Research Centre in Bombay. In 1975 he resigned from his job after getting in touch with the anti-nuclear movement that at that time was emerging globally. After his resignation, he joined the new born KSSP in his home province of Kerala. After the success of the KSSP alphabetization campaigns M.P. took steps to extend the activities of the movement at a national level. His role was fundamental in the setting up of the All India People's Science Network (AIPSN), the common platform that connects all the Indian PSMs. His view is that there is a deep irrationality concerning the notion of never-ending economic growth that accompanies modern capitalism. He argues that the logic of the capitalist productive system stands on profoundly irrational assumptions that threaten to destroy the basis of human sociality. The first assumption is that well-being

[4] For the history of KSSP campaigns see also (Parameswaran, 2008).

coincides with material growth and as a result the system is designed to increase industrial output without limits. The second assumption is that technology advancements are always desirable and always neutral. He explained this point using the following words:

> […] when you develop certain devices, certain processes, you develop technology. You do that to solve your problems. If you ask rich people to develop technology, they will select their problems [that is] how to become richer […] now, most of the governments and the scientists in CSIR ask the questions of the rich people. How the rich can be richer. There should be places where poor people questions are asked […] so, innovation is just an English word that shows that something new is being created, but what is objective?

His answer to this question is firmly set within a degrowth frame:

> Purpose of innovation can be to reduce your material requirement […]. It can reduce your energy requirement. It can reduce your labour time requirement. It can improve your health in one particular way or another way. Giving you more nutrition or making you safer from diseases. Or cure your diseases. So there are all these things that improve your quality life. […] Ultimately, what is the quality of life? Is it going on consuming? […] It cannot be working long time. You cannot go on. So, one has to cut consumption and redefine the concept of development and quality of life.

To M.P. the reconceptualization of development as self-reliance was attempted by Gandhi but it failed miserably because the zeitgeist of the time was moving in another direction:

> Gandhi appeared to be as going backward. Though there were a lot of progressive elements in Gandhi [thought] which even Gandhi could not differentiate [from his conservative arguments] […] Whereas Nehru and other people wanted India to be like England, Germany, and France. Go forward… modernize.

But in M.P.'s mind the modernisation project is framed by the interests of the dominant classes which openly collide with the interests of the poor. In the race for innovation triggered by the globalization process the rich are winning. In India as well, there is no space for innovation for the poor because, after liberalization of the economy, innovation and its management became synonymous with the corporate world. In his view, apart from the rare interests of a few academics, the scientific community frames innovation within the market economy dominated by big business. As a consequence, the innovation efforts are concentrated on expanding the needs of middle class people. M.P. has quite sharp opinions about the new trend represented by the concept of inclusive business models and inclusive innovation:

> [Inclusive business] is a subsidiary concept. Business needs to be exclusive. It needs to exclude the majority of people […] because that is the only way to make money, because you have to. […] rich are rich because poor are excluded.

The argument here, in line with the Marxist tradition, is that the interests of capital are diametrically opposed to the interests of the proletariat classes that have no other sources of income but selling their labour. However, unlike the pure Marxist thinker, the issues created by the unequal class structure are not resolved by reversing the ownership of the means of production but by changing the way of production from centralised industrialism to small scale self-reliance. It is in this scenario that the idea of *local, interconnected self-reliant economies* is combined with a planned *reduction of growth*, consumption and industrial throughputs to guarantee the long term sustainability of human society. In this frame the role of science, technology and innovation is to upgrade, improve and interconnect the network of small scale self-reliant communities.

5 Discussion

In this paper we have explored the framing of science and technology emerging from a case study in a non-Western, 'developing' world context, one in which the idea of degrowth is prominent. Authors such as Escobar (2015) and Thomson (2011) have suggested that non Western 'indigenous societies offer us much to learn from, as they contain elements central to the degrowth and ecosocialist movements' which calls for a new economic, cultural, environmental and political paradigm (Thomson, 2011). The case of the KSSP suggests that the framing, purposes and intended outcomes of science and technology are intrinsically linked to the values, motives and socio-political aspirations of those who enact and promote technical change: their world views. In other words, emerging from an acknowledgement that science and technology are both socially and politically constructed, these become a vector (Stirling, 2008), or means, to enact goals that are fundamentally socio-political in nature. An intriguing and original formulation of the role of tools and technology in human life has been found by Ivan Illich (1981: Chapter IV) in the late Middle ages. Drawing on the seminal work of the cleric Hugh of St. Victor who lived in France at the end of 12th century, Illich rediscovers the notion of *tools as remedies* i.e., the necessity of human beings to remedy their natural weakness through the use of technological artefacts. Hugh describes the quest for technology as '*the caring pursuit of truth, motivated not by that love which cherishes the well-known, but driven by the desire to pursue further what has been tasted and has been found pleasing*' (Illich, 1981: 87). According to Illich, this formulation is neither compatible with the modern concept of research and development nor with the Baconian desire to subjugate nature. It is not even '*the pure, disinterested research which aims at finding and publishing the truth*', but a medieval formulation of something that today we might call *Science by People*. This idea is surprisingly connected to the Gandhian notion of rural technology framed within the boundaries of the *Satyagraha*, e.g. 'the insistence on truth' that guided the pacifist movement which led to the Indian independence. Consequently, through a process that mixes Marxist with anti-modernist stances, a similar principle guides activities of the KSSP in the technological domain.

The commitment of KSSP activists to a democratic process designed to empower rural dwellers in Kerala has led to a hybrid formulation of technology focused on low-tech, affordable and autonomous solutions. Similar cases have been documented in other Indian states (e.g. see the Honey Bee Network (Gupta, 2012) and People Technological Initiatives (Abrol, 2005)). As Dinerstein (2014) has suggested, this is a common process shared by many countervailing indigenous movements around the globe e.g. Buen vivir movements in the Andes, Zapatistas in Mexico, factories occupation in Argentina or Sem Terra in Brazil. By 'Asking, we walk' (e.g. a process of trial and error and by reflecting democratically on the meaning of their collective action) those movements confront the hegemonic discourse of mainstream technology/innovation aimed at market - led growth, challenge existing matrices of power, create new spaces to explore new forms of labour, democracy, land ownership, indigenous autonomy, education, relation with nature and politics and, overall, the role of science and technology there-in (Kumar, 2013).

The story of the KSSP, we think, provides interesting insights for the degrowth community - and for post-growth scholars in general - e.g. degrowth, steady-state and other non-growth focusing alternatives - in two regards. First it shows a concrete example of an alternative framing of technology as *the outcome of a set of linked, normative principles* which include and accommodate those intimately connected to those of degrowth In asking 'what kind of society would enable 'technology for degrowth' the association of the principle of degrowth with others in a broader constellation seems important. A focus on the principle of *social justice* in the early years of the KSSP activities delivered a number of alternatives to the public/private sectors to empower the rural population through scientific literacy. These activities created momentum to translate scientific knowledge into practical knowledge linked to the principles of *self-sufficiency and autonomy*. An

emphasis on *low-tech and low-scale* projects was favoured over scale up and horizontal organization and a locally-based, subsistence economy was favoured over centralised entities and profit. The result is a complex ecosystem of experiments, a process of trial and error that still survives in the shade of the dominant paradigm of Indian growth-oriented industrialisation.

Second, the KSSP case shows that alternative technological paradigms based on principles aligned with those of degrowth are not only possible but can and do *co-exist* with the hegemonic paradigm. These can create a big impact - i.e. according to KSSP informants thousands of people have benefited from their low-tech technologies (see Figure 4).

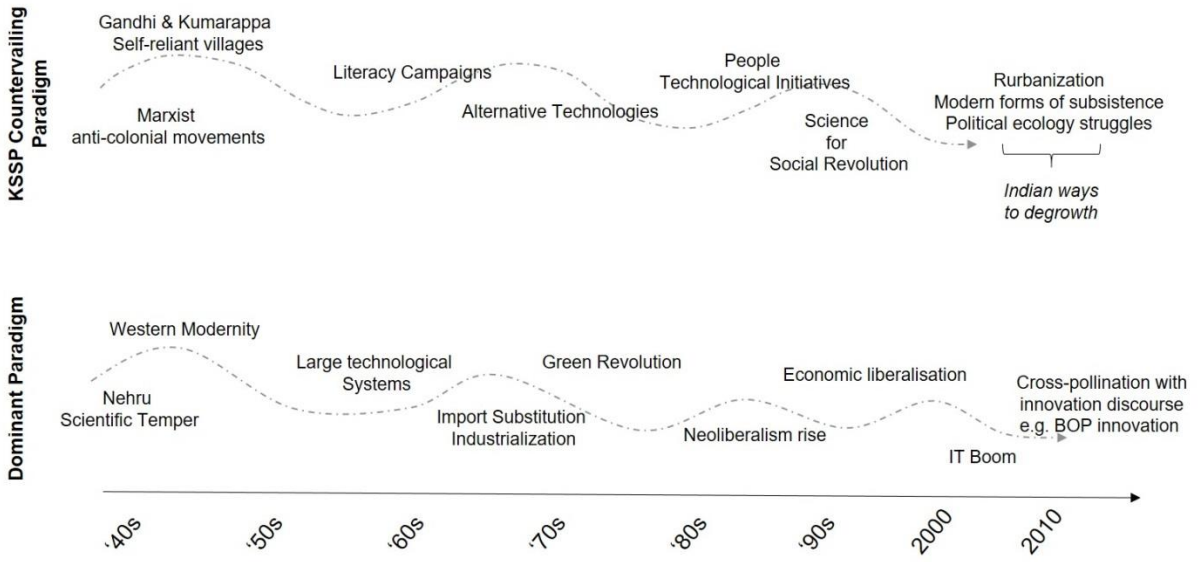

Figure 4 KSSP's discourse evolution vis-à-vis the Indian dominant paradigm of Growth – oriented Science and Technology

KSSP's activities themselves began during the early 1960s, a period dominated by the influential personality of Jawaharlal Nehru. The first Prime Minister of India was fully committed to the modernity project and to the development of a Western-shaped science and technology system of institutions based on what he called the 'Scientific Temper', i.e. a way of life based on scientific rationality. These ideas led Nehru to start a vast process of modernization through industrialization and the construction of a huge network of infrastructures in India. On the other hand, the KSSP, although being also strongly committed to the idea of scientific rationality, focused on the *politics* and *power dynamics* inherent within technological progress. They were convinced that industrialisation in India would favour the privileged classes of the time. Instead of focusing on supporting the development of large technological systems, as described above they conducted literacy campaigns in the local languages to guarantee the access to knowledge for all. In the middle of the green revolution and the policy of import substitution led by the central government, the KSSP started promoting appropriate/alternative forms of technologies that better served the needs of the rural population in Kerala. The practical applications of this idea are the PTIs, a sort of 'proto innovation system' applied to the Indian rural world. The creation of the PTIs emerged from the conviction that the mainstream thinking only focuses on how to remove the barriers that encumber the interactions between research organizations and the practitioners' world in the limited context of public-private relationships. The mainstream Indian innovation policy, in the KSSP's view, totally neglects the question of participation and equality of access for the weaker sections of society. The villagers' role is merely to make their land and labour available for agricultural production, or at best, to participate in the process of value creation as lower-end producers in long value chains

controlled by large scale private/public organizations. But while the Innovation System approach popular in the North seeks to replace the existing relations between the productive forces of the economy with more efficient technological systems, the PTIs attempt to do the opposite: to build technology system *around* local knowledge and resources (Abrol, 2003).

During the age of neoliberal expansion in the 1980's to this day, the KSSP has continued to promote technological initiatives focused on people and on the creation of alternative forms of subsistence. At the same time, they have evolved their positions to include elements of political ecology (e.g. struggles against big dams and non-renewable energy projects) and political autonomy (Gadgil and Guha, 1994) in combination with the vibrant Indian eco-socialist environment (Bauer, 2015; Huan, 2010). All those elements combined can be framed in what Kothari (2014) has named Radical Ecological Democracy i.e. an alternative framework of well-being that rejects extractivism and the paradigm of growth while embracing 'new political governance with decentralised decision-making embedded within larger, ecologically and culturally defined landscapes, a new economics that respects ecological limits and democratises both production and consumption, and a new cultural and knowledge-based society that values diversity, collective synergism, and public innovation' (Kothari, 2014: 62).

Despite their real and potential impact, the alternatives pursued by movements like KSSP are however largely neglected by the mainstream discourse of technology and innovation for the poor in India, which is becoming increasingly dominated by the BOP pro-market approach. Nevertheless, in defiance of the hegemonic role of economic neoliberalism in contemporary India, the notion of development and the role of technology remain highly contested (Shrivastava and Kothari, 2012). Furthermore, it is important to notice here that there is still an ongoing debate on the success or otherwise of the Kerala model, which the KSSP has played such an important role in fostering. Paradoxically, Kerala's development trajectory, while not heavily industrial, is in other ways strikingly unsound in both environmental and social terms: it is characterized by rapidly depleting water resources, financial instability, and heavy dependence on global remittances and tourism (Franke and Chasin, 1999; Raman, 2010). The future challenges for movements like KSSP will be to keep public debate open to discuss their alternatives and create new spaces for the development of new forms of democratic governance of technological processes in which the voices of the socially excluded classes of Indian society can be heard.

6 Conclusions

Transition discourses emanating from the global South present a large, if underexplored, landscape in terms of narratives of degrowth, science and technology, and how such narratives can be translated into situated practices. As such, narratives of technology and degrowth that exist in the South, one of which we have described here, are worthy of further examination. Nevertheless we suggest that these narratives remain dominated, and overshadowed by a hegemonic discourse that privileges economic growth, industrialism and, more recently, market-oriented innovation over bottom-up alternatives which offer radically different normative underpinnings and world views. We propose the case of KSSP as a living example of a radical alternative based on the principle of science and technology for the people and by the people in which social justice, autonomy, self-reliance, community, low tech solutions and limiting consumption are combined with degrowth as a constellation of related elements. KSSP is a useful example for *degrowthers* about the importance of framing technology politically. *This reinforces the idea that 'degrowth' is a political and not just a technical project*. During more than 50 years of activities, indeed, the KSSP has been able to engage vast portions of the population in the state of Kerala in India in the development of a democratic and

horizontal process of technological governance that favour autonomy, ecological integrity and political empowerment. In this sense, the label 'eco-socialist' that has been used to address this new wave of social movements in India is not just piece of jargon to be thrown into academic discussion — it is a distinctive mode of counter-hegemonic analysis. We suggest that cases like the KSSP not only show that the Global South has the indigenous capacity to escape imported growth fetishism but also may prove an important locus to identify, explore and enrich the concept of degrowth movements, both in the South and the North. Finally is important to remember that KSSP's ideas were not developed in an Indian vacuum: in fact, they show the fertility of taking Western ideas and scientific expertise and retrofitting them for a completely new context. Not only does the South provide alternative paradigms, but a further (hopefully inspiring) lesson for degrowth/post-growth scholars might be that such paradigms can develop as a conversation between the South and the North, and between theory and practice. Further research could provide new insights about the historical evolution of those alternative paradigms and the associated compromises, tensions, resistances, dependencies, strategies and successes. An analysis that looks at the experiences of such transition discourse projects and programmes could we argue tap a rich reservoir of knowledge of great potential value to the degrowth community.

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